REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Office Action dated February 7, 2005. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-84 are under consideration in this application. Claims 1, 9-11, 15-16, 23-30, 35-39, 42-43, 51-53, 57-58, 65-72, 77-81 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim Applicants' invention.

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Formality Rejection

Claims 15-20 and 57-62 were rejected under 35 U.S.C. § 112, second paragraph, as being confusing and conflicting with the claim limitations specified in the parent application. Claims 15-16 and 57-58 are being amended to recited "means for performing said second processing by generating the intensity value by progressively ~~increasing~~ decreasing the intensity value at an absolute value of said decreasing rate". Accordingly, the withdrawal of the outstanding informality rejections is in order, and is therefore respectfully solicited.

Prior Art Rejections

Under 35 U.S.C. § 103(a), (1) Claims 1-2, 5-6, 9-12, 23-24, 43-44, 47-48, 51-54 and 65-66 were rejected as being unpatentable over US Patent No. 5,392,385 to Evangelisti et al. (hereinafter "Evangelisti") in view of US Patent No. 6,005,580 to Donovan (hereinafter "Donovan"); (2) Claims 3-4, 13-14, 45-46 and 55-56 were rejected as being unpatentable over Evangelisti, in view of Donovan, and further in view of US Patent No. 5,287,438 to Kelleher (hereinafter "Kelleher"); (3) Claims 7-8 and 49-50 were rejected as being

unpatentable over Evangelisti, in view of Donovan, and further in view of US Patent No. 5,278,949 to Thayer (hereinafter "Thayer"); (4) Claims 21-22 and 63-64 were rejected as being unpatentable over Evangelisti, in view of Donovan, and further in view of US Patent No. 5,841,439 to Pose et al. (hereinafter "Pose"); (5) Claims 25-42 and 67-84 were rejected as being unpatentable over Evangelisti, in view of Donovan, and further in view of Japanese Laid-Open No. 07-105390 to Ikumi et al. (hereinafter "Ikumi"). Lastly, the prior art reference of Dickson et al. (4,873,515), Kumazaki et al. (5,325,474), Goyins et al. (5,461,703), Steiner et al. (5,668,940), Diehl (5,673,379), Dye (5,684,941), Kuchkuda et al. (5,872,902), Lee et al. (5,903,279), McNamara et al. (6,329,977) and Thrasher (6,791,547) were cited as being pertinent to the present application. These rejections have been carefully considered, but are most respectfully traversed.

The invention applies the anti-aliasing method (line 32, page 1 to line 33, page 2), as now set forth in independent claims 1, 9-11, 23-30, 37-39, 43, 51-53, 65-72, and 79-81 for drawing smoothly the edge portions of a polygon. The invention determines the intensity values on each edge of a triangle (Figs. 5 and 6 of the specification) rather than the intensity values of all pixels inside the triangle as in the prior art. In addition, the invention determines the intensity value on each edge of a triangle relative to two reference points, such as XRi, XRe in Figs. 5-6 or XRir (=1), XRer (=0) in Figs. 8A-8B (p. 30, lines 10-16), rather than one base point. Such a "pair" reference feature of the present invention is inherent in the anti-aliasing method, which assumes each line to be drawn having certain width, as the first pair or the second pair intersection positions recited in claim 1. Moreover, the scan line processing of the invention calculates an intensity value to be given to each portion of a polygon in a scanning direction with respect to each scan line, based on line intersection data (XLe, XLi, XRi, XRe) obtained for each scan line by an edge calculating device. Such a "dual-pair" reference feature of the invention is also inherent in the anti-aliasing method as the first pair and the second pair intersection positions recited in claim 1. An intensity value which changes gradually on each edge of a triangle (Figs. 5, 6, 29; lines 3-7, page 26) but keeps *constant* inside the triangle in the invention. The lattice points XLe, XLi, XRi, XRe of the invention are points on displayed grid boxes located immediately *inside* the real intersections of the scan line with the edges rather than right *on* the real intersections (edges) (lines 16-25, page 25). For example, Xri in Fig. 5 falls outside of the diamond box, so does Xli in Fig. 6. In particular, different methods/equations (depending on the relative slopes of

the right and left edges) are employed for obtaining the respective coordinate values and intensity values of each of the four lattice points (Figs. 7A-B, 8A-B; lines 13-32, page 26).

Most importantly, the present invention, as recited in all independent claims, calculates line intersection data associated with an intersecting portion between each of edges of the polygon (maybe drawn by combining a plurality of triangles, e.g., claim 25) to be drawn, and each scan line, using vertex coordinates of the polygon/triangles to be drawn. The above construction makes it possible to perform an anti-aliasing processing and a drawing processing at the same time. As such, the intensity value calculation processing is performed ***concurrently*** with the line intersection data calculation processing such that the invention does not require the writing processing into and the reading processing from the frame buffer as required in the cited references. This makes it possible to realize the higher speed drawing processing which cannot be achieved by the cited references.

In contrast, Evangelisti, Donovan, and Ikumi merely disclose first writing a pixel or an image once into a frame buffer and then reading out the pixel or the image from the buffer and ***then*** performing anti-aliasing processing such that they do not perform anti-aliasing processing and drawing processing at the same time. The other cited references simply fail to compensate for the deficiencies.

In particular, Evangelisti first writes pixel values of a triangle in a frame buffer, reads out the stored triangle pixel values from the buffer, and thereafter performs an anti-aliasing processing on the readout pixel values (col. 8, line 68 to col. 9, line; col. 9, lines 39-55).

Donovan draws a selected polygon as an output image in a frame buffer (step 240 in FIG. 2; col. 5, line 30; cols. 13 and 14), reads out the output image drawn in the frame buffer, subjects the output image to a filtering processing, and then performs an anti aliasing processing (step 250 in FIG. 2; col. 5, line 50) in which an intersection point between a scan line and an edge of the already drawn polygon is calculated, a texture coordinate and a pixel coordinate for every intersection point are identified, and a filtering operation is performed to determine corrected pixel colors.

In short, both Evangelisti et al. and Donovan write a pixel or an image once into a frame buffer, and then read out the pixel or the image from the buffer to perform anti-aliasing processing. Thus, both the cited references fail to disclose or suggest performing anti-aliasing processing and drawing processing at the same time as in the present invention where the intensity value calculation processing is performed while simultaneously performing the line intersection data calculation processing based on vertex coordinates when a polygon is

about to be drawn using the vertex coordinates. Evangelisti et al. and Donovan require data writing processing into and data reading processing from the frame buffer because a pixel or an image once written into the frame buffer must be read out therefrom for the anti-aliasing processing. A considerable time is required for the writing processing and the reading processing.

This is also true for Ikumi. Specifically, Ikumi draws a polygon divided into triangles beforehand in accordance with data including vertex coordinates of each triangle and a discrimination flag set for the triangle to indicate whether a periphery line corresponding to the vertex is a boundary line or a parting line. Thus, Ikumi lacks the feature of "calculating line intersection data performed based on vertex coordinates of each of triangles to be drawn and a control bit which indicates whether each edge of each triangle is to be drawn, the line intersection data relating to a position and an intensity value of an intersecting portion between each edge of each triangle and each scan line, and the sequential calculation of the intensity value to be given to each portion of each triangle based on the calculated line intersection data" as recited in claim 25.

To sum up, the concurrent "anti-aliasing processing" and "drawing processing" as now recited in claims 1, 9-11, 23-30, 37-39, 43, 51-53, 65-72, and 79-81 are not taught or suggested by any of the cited prior art references.

Applicants contend that none of the cited references or their combinations teaches or suggests each and every feature of the present invention as recited in independent claims 1, 9-11, 23-30, 37-39, 43, 51-53, 65-72, and 79-81. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance

of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

Respectfully submitted,

Stanley P. Fisher
Registration Number 24,344

Juan Carlos A. Marquez
Registration Number 34,072

REED SMITH LLP
3110 Fairview Park Drive, Suite 1400
Falls Church, Virginia 22042
(703) 641-4200

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